

1 What is claimed:

1. **(Currently amended)** A system for synthesizing a nano-scaled powder material, comprising:

- (A) a chamber for receiving nano-scaled clusters generated from a material selected from the group consisting of a metal, a metal compound, and a ceramic;
- (B) a twin-wire electrode device in supplying relation to said chamber for supplying nano-scaled clusters therein, said electrode device comprising
  - (i) two wires made up of said material, with each wire having a leading tip which is continuously or intermittently fed into said chamber in such a fashion that the two leading tips are maintained at a desired separation; and
  - (ii) means for providing electric currents and a working gas flow for creating an ionized a first plasma arc between the two leading tips for melting and/or vaporizing said material to generate said nano-scaled clusters;
- (C) means for injecting a quench gas and/or a reaction gas into a quenching/reaction zone inside said chamber at a point ~~inside said arc~~ or downstream from said arc to facilitate the formation of nano-scaled powder particles; and
- (D) means to collect the nano-scaled powder material.

11 2. **(Currently amended)** The system as defined in claim 1, further including a second plasma arc zone below said ionized first plasma arc to vaporize any un-vaporized material dripped therefrom.

16 21 3. **(Currently amended)** The system as defined in claim 1, wherein said arc defines a shape having a top portion and a bottom portion and said system further includes including a reservoir disposed at the bottom portion of said arc or a distance below said arc in such a fashion that said reservoir receives any un-vaporized material from the wires and exposes said un-vaporized material to the heat energy of said arc to further vaporize at least a portion of said un-vaporized material.

1       4. **(Currently amended)** A system for synthesizing a nano-scaled powder material mixture, comprising:

- (A) a chamber for receiving nano-scaled clusters generated from two materials of different compositions with each material selected from the group consisting of a metal, a metal compound, and a ceramic;
- (B) a twin-wire electrode device in supplying relation to said chamber for providing nano-scaled clusters therein, said electrode device comprising
  - (i) two wires respectively made up of said two different materials, each wire having a leading tip and each wire being continuously or intermittently fed into said chamber in such a fashion that the two leading tips are maintained at a desired separation; and
  - (ii) means for providing electric currents and a working gas flow for creating an ionized arc between the two leading tips for melting and/or vaporizing said materials to generate said nano-scaled clusters;
- (C) means for injecting a quench gas and/or a reaction gas into a quenching/reaction zone inside said chamber at a point ~~inside said arc~~ or downstream from said arc to produce a nano-scaled powder particle mixture; and
- (D) means to collect the nano-scaled powder material mixture.

5. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 further including wire feed and control means to regulate the feed rates of said two wires.

21     6. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 wherein said means for providing electric currents comprises an electric power supply selected from the group consisting of a high-voltage source, a high-current source, a pulsed power source, and combinations thereof.

26     7. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 further including means for controlling the rate of flow of the quench gas and/or the reaction gas, thereby enabling change of particle size of the nano-scaled powder material.

1       8. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 wherein said reaction gas  
is selected from the group consisting of nitrogen, phosphorus, arsenic, oxygen, sulfur, selenium,  
tellurium, fluorine, chlorine, bromine, iodine, a carbon-containing gas, and mixtures thereof.

9. **(Cancelled).**

10. **(Cancelled).**

6       11. **(Previously presented)** The system as defined claim 1, 2, 3, or 4 wherein said means for  
injecting comprises a concentric gas injection device adjustably positioned along the location of  
said ionized arc.

11      12. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 wherein said quench gas  
is selected from the group consisting of helium, argon, air, water vapor, carbon monoxide, carbon  
dioxide, hydrogen and combinations thereof.

13. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 further including means  
for providing dissociable inert gas mixable with said working gas, the dissociable inert gas  
increasing the temperature gradient in said ionized arc.

16      14. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 further including means  
separate from said means for injecting a quench/reaction gas, said separate means for injecting a  
cooling gas into said nano clusters, thereby minimizing agglomeration of the nano powder  
material or mixture.

15. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 wherein said working gas  
flow direction is approximately vertical.